Three New Saprophytic Chytrids

Anne M. Hanson

During a routine survey of fungi present in soil and water samples collected at Sharon, Connecticut, three new chytridiaceous species were discovered and isolated. The largest of these is eucarpic and polycentric, and resembles species of *Catenaria* in several characters, but differs fundamentally by the possession of operculate sporangia. Present studies indicate that it represents a new genus of operculate polycentric chytrids for which the name *Catenomyces* is hereby proposed.

Catenomyces gen. nov.—Thallo semper fere polycentrico, raro monocentrico, intramatricali atque extramatricali: parte intramatricali ramosa vel singula, septata; septis rudimenta sporangiorum vel isthmorum sterilium disiungentibus; parte extramatricali ramosa, non septata atque sterili. Sporangiis cum uno vel pluribus tubulis dimissionis, operculis sub obturamenta mucilaginosa evolventibus, Zoosporis a posteriore uniflagellatis. Sporis perdurantibus incompertis aut dubiis.

Catenomyces nov. gen.—Thallus usually polycentric, rarely monocentric, intra-and extramatrical; intramatrical portion branched or unbranched, septate; septa delimiting the rudiments of the sporangia or sterile isthmuses; extramatrical portion branched, aseptate and sterile. Sporangia with one to several exit tubes in which opercula develop beneath mucilaginous plugs. Zoospores posteriorly uniflagellate. Resting spores unknown or doubtful.

Catenomyces persicinus sp. nov.—Protoplasmate hypharum extramatricalium globulos aureos refractivos evolvente, protoplasmate hypharum extramatricalium hyalino manente. Zoosporangiis levibus, sporae plasmate maturitate persicino colorato, forma variabilibus, uteriformibus, 21-71 x 25-82 μ, pyriformibus, 12-45 x 19-82 μ, ovatis, 17-63 x 28-97 μ, cylindricis, 6-15 x 19-75 μ, sphaericis, 17-57 μ, ellipticis, 21-62 x 37-159 μ, orthogoniis, 43-55 x 59-83 μ, triangulis, 35-59 x 44-65 μ, vel irregularibus, 26-67 x 35-193 μ, cum 1-9 canalibus exeuntibus, 3.7-16 x 7.5-112 μ, aliquando ramosis, uno solo dehiscente. Apicibus papillarum vel canalium exeuntium maturitate mollescentibus, obturamento materiae mucilaginosae completis; protoplasmate deorsum recedente atque operculum sub obturamentum formante. Operculis maxime tenuibus, forma patellae similibus, rotundis vel ovatis, 2.2-2.9 μ, diametro. Zoosporis sphaericis, 3.7-4.5 μ, cum multis globulis aureis refractivis, flagello circiter 30 μ longitudine, singillatim emergentibus et cumulum ad tempus prope orificium formantibus, interdum amoeboideis. Sporis perdurantibus dubiis.

Catenomyces persicinus nov. sp.—Protoplasm of intramatrical hyphae developing golden refractive globules, while the protoplasm of the extramatrical hyphae remains hyaline. Zoosporangia smooth, with peach-colored spore plasm at maturity, variable in shape, uteriform, 21-71 x 25-82 μ, pyriform, 12-45 x 19-

82 μ, ovoid, 17-63 x 28-97 μ, cylindrical, 6-15 x 19-75 μ, spherical, 17-57 μ, elliptical, 21-62 x 37-159 μ, rectangular, 43-55 x 59-83 μ, triangular, 35-59 x 44-65μ, or irregular, 26-67 x 35-193 μ, with 1-9 exit canals, 3.7-16 x 7.5-112 μ, frequently branched, and of which only one functions. Tips of exit papillae or canals softening at maturity and becoming filled with a plug of mucilaginous material; granular protoplasm receding downward and forming an operculum beneath the plug. Opercula extremely thin, shallow saucer-shaped, circular or oval in outline, 2.2-2.9 μ, in diameter. Zoospores spherical, 3.7-4.5 μ, with many golden refractive globules, flagellum approximately 30 μ long, emerging singly and forming a temporary group near the orifice, intermittently amoeboid. Resting spores doubtful.

Saprophytic on grasses, bleached corn leaves, onion, and cellophane, Sharon, Connecticut.

The second species is monocentric and *Rhizophydium-like*. The sporangia and resting spores are surrounded by one or several hyaline zones or halos which stand out very sharply when stained with ruthenium red or gentian violet. The structure and development of this chytrid are fundamentally similar to those of species of *Rhizophydium*, and for this reason it is included in this genus under the name *R. coronum* nov. sp.

Rhizophydium coronum sp. nov.—Zoosporangiis hyalinis, sphaericis, 11-49 μ diametro, ovatis, 10-48 x 14-54 μ, cum muris laminatis, lamina externa saepe prope superior sporangi dirupta; una vel quinque papillis exeuntibus, 3-3.7 x 9-11 μ. Uno vel compluribus coronis concentricis sporangia evolventia circumdantibus, uno maturitate reliquo ante sporarum dimissionem plerumque deliquescente. Zoosporis hyalinis, sphaericis, 3.7-4.5 μ, cum uno magno globulo refractivo, 1.5 μ diametro, primis zoosporis cumulo emergentibus, post 6-14 horae sexagesimas partes devidentibus, reliquis in sporangio natantibus et singillatim emergentibus. Rhizoidibus mediocriter rigidis, cum 1.5-4.5 μ muris crassis, directis, tortuosis, minime vel maxime ramosis, uno saepe dominante atque maxime extenso usque ad 500 μ longitudine. Spora perdurante sphaerica vel subsphaerica, 22-35 μ diametro, cum muro lamellato sporangio simili, 0.7-1.3 μ crasso, pallido auro tincta. Spora perdurante unum vel plures magnos globulos medios strato, peripherali globulorum minorum circumdatos continente. Zoosporangio simili uno vel compluribus coronis involuta, atque germinatione prosporangi modo se gerente, zoosporangio hyalino 29-37 μ diametro oriente, quod deinde corono involvitur.

Rhizophydium coronum nov. sp.—Zoosporangia hyaline, spherical 11-49 μ in diameter, ovoid 10-48 x 14-54 μ, with laminated walls, outer lamina often disintegrating around the upper half of the sporangium; one to five exit papillae, 3-3.7 x 9-11 μ. One to several concentric halos surrounding the developing sporangia, reduced to one at maturity, which generally deliquesces before spore discharge begins. Zoospores hyaline, spherical, 3.7-4.5 μ, with one large refractive globule, 1.5 μ in diameter, the first zoospores emerging as a coherent mass, separating after 6-14 minutes, the remainder swimming in the sporangium

and emerging singly. Rhizoids fairly rigid, with 1.5-4.5 μ, thick walls, straight, coiled, sparingly or richly branched, one rhizoid often predominant and very prolonged, up to 500 μ in length. Resting spore spherical or sub-spherical, 22-35 μ in diameter, with a lamellated wall like that of the sporangium, 0.7-1.3 μ, thick, with a faint golden tint; contents of resting spore consisting of one or more large central globules surrounded by a peripheral layer of smaller globules; enveloped like the zoosporangium by one or several halos, acting like a prosporangium upon germination, giving rise to a hyaline zoosporangium 29-37 μ in diameter, which in turn is enveloped by a halo.

Saprophytic on grasses, bleached corn leaves, and cellophane, Sharon, Connecticut.

The third species belongs in the monotypic genus *Catenochytridium* and differs from the type species, *C. carolinianum,* by its smaller multiguttulate zoospores, by the asymetrical position of the sporangium and the presence of a predominant primary apophysis. Because of these differences it is regarded as a new species and given the name *C. laterale* nov. sp.

Catenochytrium laterale sp. nov.—Zoosporangiis hyalinis, levibus, ovatis, 16-46 x 21-62 μ, sphaericis, 12-44 μ, pyriformibus, 12-48 x 18-71 μ, cylindricis, 15-25 x 61-93 μ, atque intramatricalibus solis cum lobis, 28-63 x 88-160μ; operculo apicali, sub-apicali, laterali, 7.5-15 μ diametro, plerumque in sporangio vacuo persistente. Primaria cellula apophysidis semper dominante, sphaerica, ovata vel cum lobis, usque ad 27-30 μ diametro. Segmentis catenulatis apophysidis 1-7 numero, seriebus linearibus 1-4, primariae apophysidis cellulae a latere vel ab apice affixis ut inter primariam apophysidis cellulam atque sporangium emergant, raro ex radice primariae apophysidis cellulae emergentibus, saepe omnino deficientibus. Rhizoideo systemate (apophyside primaria addita) usque ad 224 μ magnitudine, minutissime ramificato, dichotomo. Zoosporis hyalinis, sphaericis, 2.9-4.5 μ, cum duobus, tribus, quattuor (raro uno), globulis refractivis; flagello 26-30 μ longitudine. Capsa zoosporae semper in zoosporangio persistente, crassa, bulbosa, numquam depressa, sucino vel atro-fusco colorata, raro apicali vel laterali, tuberculo simili in radice sporangi manente. Sporis perdurantibus non observatis.

Catenochytridium laterale nov. sp.—Zoosporangia hyaline, smooth, oval, 16-46 x 21-62 μ, spherical, 12-44 μ, pyriform, 12-48 x 18-71 μ, cylindrical, 15-25 x 61-93 μ, and lobed, 28-63 x 88-160 μ, when developed intramatrically; operculum apical, sub-apical, or lateral, 7.5-15 μ in diameter, generally persistent on the empty sporangium. Primary apophysate cell always predominant, spherical, ovoid, or lobed, up to 27-30 μ in diameter. Catenulate segments of the apophysis 1-7 in number, arranged in 1-4 linear series attached to the primary apophysate cell laterally or apically, so that they emerge between the primary apophysate cell and the sporangium, rarely emerging from the base of the primary apophysate cell, often completely lacking. Rhizoidal system (including primary apophysis) up to 224 μ in extent, becoming finely branched;

branching dichotomous. Zoospores hyaline, spherical, 2.9-4.5 μ, with two, three, four (rarely one), refractive globules; flagellum 26-30 μ long. Zoospore case always persistent on the zoosporangium, thickened, bulbous, never flattended, amber to dark brown in color, rarely apical or lateral, but remaining like a basal protuberance on the sporangium. Resting spores not observed.

Saprophytic on grasses, bleached corn leaves, onion, and cellophane, Sharon, Connecticut.

The author wishes to express her gratitude to Professor John S. Karling under whose direction this work is being carried on, and to Miss Elsie Walush for the Latin diagnoses.

Department of Botany, Columbia University
New York City